

الف $y = x^3 - 3x^2 + 3x$

$y = (x-1)^3 + 1 \rightarrow y-1 = (x-1)^3 \rightarrow x = \sqrt[3]{y-1} + 1 \quad R_f = \mathbb{R}$

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ب $y = \frac{1}{x^2 - 2x}$

$y x^2 - 2y x = 1 \rightarrow y(x^2 - 2x) = 1 \rightarrow x^2 - 2x = \frac{1}{y} \rightarrow (x-1)^2 - 1 = \frac{1}{y} \rightarrow x-1 = \sqrt{\frac{1}{y} + 1} \rightarrow x = \sqrt{\frac{1}{y} + 1} + 1$

$\frac{1+y}{y} \geq 0 \quad \begin{matrix} -1 & 0 \\ + & - \end{matrix} \quad R_f = (-\infty, -1] \cup (0, +\infty)$

الف $y = x^2 - 4x + 10 \quad a > 0$

$\begin{cases} x_{min} = \frac{-b}{2a} \\ y_{min} = (2)^2 - 4(2) + 10 = 6 \end{cases} \quad R_f = [6, +\infty)$

سوال 2

ب $y = -x^2 + 4x + 3 \quad a < 0$

$\begin{cases} x_{max} = \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ y_{max} = (2)^2 - 4(2) + 3 = 1 \end{cases} \quad R_f = (-\infty, 1]$

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ج $y = \sqrt{x^2 - 4x - 5} \quad a > 0$

$\begin{cases} x_{min} = \frac{4}{2} = 2 \\ y_{min} = (2)^2 - 4(2) - 5 = -5 \end{cases} \rightarrow R_f = \sqrt{[-5, +\infty)} = [0, +\infty)$

د $y = \sqrt{4x - x^2} \quad a < 0$

$\begin{cases} x_{max} = \frac{-b}{2a} = \frac{-4}{-2} = 2 \\ y_{max} = 2 \end{cases} \quad R_f = \sqrt{[-4, 4]} = [0, 2]$

الف $y = x^3 - 3x^2 + 3x + 1 \quad \text{توان فرد} \quad R_f = \mathbb{R}$

سوال 3

ب $y = x^4 - 4x^2 + 3x + 2 \quad \text{توان فرد} \quad R_f = \mathbb{R}$

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ج $y = \sqrt{x^4 - 4x^2 + 3x + 1} \quad \text{دیر رادیکال} \quad R_f = \sqrt{\mathbb{R}} = [0, +\infty)$

د $y = (x^3 - 3x^2 + 3x + 1)^2 \quad \text{توان فرد} \quad R_f = (-\infty, +\infty)^2 \rightarrow R_f = [0, +\infty)$

الف $y = \frac{x+1}{x-2} \quad R_f = \mathbb{R} - \{2\}$

ب $y = \frac{x+1}{x+1} \quad R_f = \mathbb{R} - \{-1\}$

سوال 4

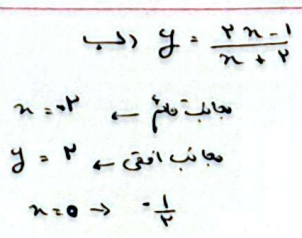
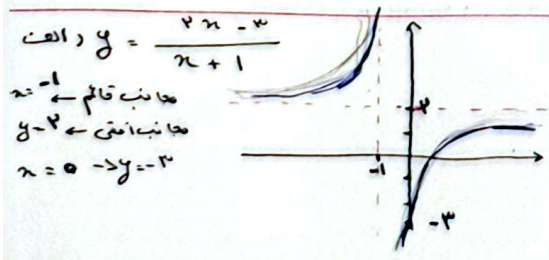
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الف $y = \sqrt{\frac{x+1}{x+1}} \quad \text{هردو رادیکال} \quad R_f = \sqrt{\mathbb{R} - \{-1\}} = R_f = [0, +\infty) - \{\sqrt{-1}\}$

سوال 5

ب $y = \sqrt{\frac{x+1}{x-2}} \quad \text{هردو رادیکال} \quad R_f = \sqrt{\mathbb{R} - \{-2\}} = R_f = [0, +\infty)$

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سوال 6

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مثال 1) $y = \sin x + \frac{1}{\sin x}$ $R_f = (-\infty, -1] \cup [1, +\infty)$

سوال 1

ب) $y = \frac{x^2+1}{x^3} = x^{-1} + \frac{1}{x^3}$ $R_f = (-\infty, -1] \cup [1, +\infty)$

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2) $y = \frac{\sqrt[3]{x^2+1}}{\sqrt{x}} = \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}}$ $R_f = (-\infty, -1] \cup [1, +\infty)$

3) $y = \sqrt{x} + \frac{1}{\sqrt{x}}$ $R_f = [1, +\infty)$

$y = x^2 + \frac{1}{x^2+x} = x^2 + \frac{1}{x} - \frac{1}{x+1} \rightarrow (x + \frac{1}{x}), -1$

سوال 2

ب) $x=0$ كثرين صفا، $0 + 1 - 1 = \frac{1}{0+1} = 1$ $R_f = [\frac{1}{2}, +\infty)$

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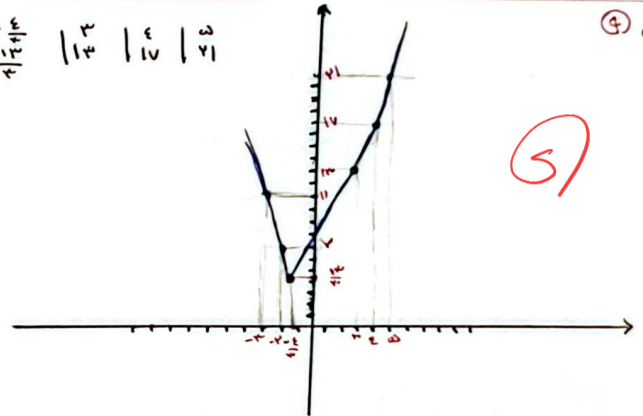
ب) $y = \frac{x^2+5}{\sqrt{x^2+4}} = \frac{x^2+4+1}{\sqrt{x^2+4}} = \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}}$

ب) $x=0$ كثرين صفا، $2 + \frac{1}{2} = \frac{5}{2}$ $R_f = [\frac{5}{2}, +\infty)$

$y = |x-3| + |x+4|$

$-\infty \quad -3 \quad -\frac{5}{2} \quad -1 \quad 3 \quad 4 \quad \infty$

$-\frac{5}{2}$	x
$-x+3-x-4$	$-x+3+x+4$
$-2x-1$	$2x+7$



سوال 3

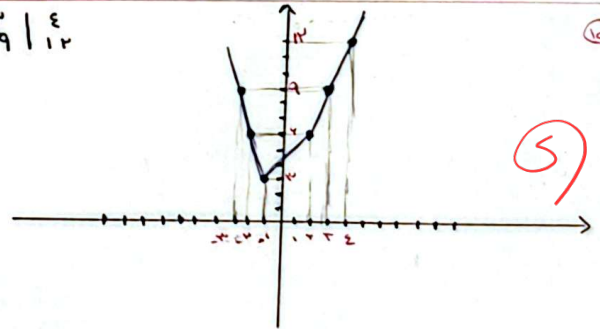
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مثال 2) $y = |x-1| + |x+2|$

$-\infty \quad -2 \quad -1 \quad 1 \quad 2 \quad \infty$

-1	x
$-x+1-x-2$	$-x+1+x+2$
$-2x-1$	$x+3$

$R_f = [3, +\infty)$



سوال 4

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ب) $y = |x-1| - |x+1|$

$-\infty \quad -1 \quad 0 \quad 1 \quad 2 \quad \infty$

-1	x
$-x+1-x-1$	$-x+1+x+1$
$-2x$	$2x+2$

$R_f = [-2, +\infty)$

